

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of
Biennial Regulatory Review – Amendment of
Parts 1, 22, 24, 27 and 90 to Streamline and
Harmonize Various Rules Affecting Wireless
Radio Services
WT Docket No. 03-264

THIRD REPORT AND ORDER

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By the Commission:

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## I. INTRODUCTION

1. On July 22, 2005, the Commission adopted a *Report and Order and Further Notice of Proposed Rulemaking*<sup>1</sup> in a proceeding commenced in 2004 to streamline and harmonize certain licensing provisions in the wireless radio services (WRS).<sup>2</sup> In the *Further Notice*,<sup>3</sup> the Commission sought comment on certain proposed amendments -- particularly the proposed changes introduced into the record by CTIA – The Wireless Association (CTIA)<sup>4</sup> -- to our radiated power rules for Part 24 broadband personal communications services, which operate in the 1850-1915/1930-1995 MHz bands (PCS), and for certain Part 27 services, namely the so-called advanced wireless services which operate in the 2110-2155 MHz band (AWS).<sup>5</sup> The Commission also sought comment on whether the proposals should be applicable to other services, such as Part 22 cellular, additional Part 27 services operating under a flexible regulatory framework, including the 700 MHz Commercial Services Band, as well as other services specifically addressed in certain parties' submissions in this docket.<sup>6</sup> Additionally, the Commission considered whether changes to other technical rules might be warranted in conjunction with changes to the radiated power rules.

2. In an April, 2007 *Report and Order and Further Notice of Proposed Rulemaking*,<sup>7</sup> we combined various proceedings, including the 700 MHz Commercial Services proceeding, the 700 MHz Guard Bands proceeding, and the 700 MHz Public Safety proceeding, to establish rules governing wireless licenses in the 700 MHz Band. We also incorporated into the 700 MHz proceeding (WT Docket No. 06-150) the issues raised in the *Further Notice* in the instant

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<sup>1</sup> See The Biennial Regulatory Review – Amendment of Parts 1, 22, 24, 27, and 90 to Streamline and Harmonize Various Rules Affecting Wireless Radio Services, WT Docket No. 03-264, *Report and Order and Further Notice of Proposed Rulemaking*, 20 FCC Rcd 13900 (2005) (*Further Notice*). See also *Further Notice, Erratum*, 20 FCC Rcd 16293 (2005).

<sup>2</sup> 47 C.F.R. § 1.907. WRS is defined in the Commission's rules as “[a]ll radio services authorized in parts 13, 20, 22, 24, 26, 27, 74, 80, 87, 90, 95, 97 and 101 . . . whether commercial or private in nature.” *Id.*

<sup>3</sup> *Further Notice*, 20 FCC Rcd at 13923-32.

<sup>4</sup> See CTIA *Ex Parte* Letter filed October 20, 2004; CTIA *Ex Parte* Letter filed February 7, 2005. Throughout this *Third Report and Order*, we will refer to CTIA's request for relief, as set forth in its February 7, 2005 *Ex Parte* Letter, as the “CTIA Proposal.”

<sup>5</sup> This AWS spectrum block (for fixed and base stations) together with the AWS 1710-1755 MHz block (for fixed, mobile and portable stations) is commonly referred to as AWS-1. Throughout this *Third Report and Order*, we use the term AWS to mean only stations operating in the 2110-2155 MHz AWS-1 band, except in the context of permitting use of “average” rather than “peak” values, discussed below in Section III.C, where we also include the 1710-1755 MHz AWS-1 band in the definition of AWS. We do not address herein changes to rules for the distinct “AWS-2” spectrum blocks (*i.e.*, 1915-1920 MHz, 1995-2000 MHz, 2020-2025 MHz and 2175-2180 MHz) or “AWS-3” spectrum block (*i.e.*, 2155-2175 MHz), which are also governed by Part 27 of the Commission's rules.

<sup>6</sup> *Further Notice*, 20 FCC Rcd at 13924-25.

<sup>7</sup> Service Rules for the 698-746, 747-762 and 777-792 MHz Bands, WT Docket No. 06-150, *Report and Order and Further Notice of Proposed Rulemaking*, 22 FCC Rcd 8064 (2007) (*April 700 MHz Order*). See also *April 700 MHz Order, Erratum*, 22 FCC Rcd 18907 (2007).

proceeding (WT Docket No. 03-264) as they pertain to the 700 MHz band, and extended certain relief requested by CTIA to the 700 MHz Commercial Services Band. This relief included the implementation of a power spectral density (PSD) model<sup>8</sup> and modifications to our rules to permit radiated power to be measured using “average” rather than “peak” values. We declined, however, to adopt CTIA’s request that we double base station radiated power limits in both rural and non-rural areas before implementing a PSD model for the 700 MHz Commercial Services Band.

3. In the *Second Report and Order* in the 700 MHz proceeding (WT Docket No. 06-150), which also resolved radiated power issues initially raised in the Commission’s 2005 *Further Notice* in WT Docket No. 03-264, the Commission specified power limits in terms of PSD limits for 700 MHz public safety broadband operations, thus enabling higher power signals from wider band technologies and creating a more technologically neutral environment.<sup>9</sup> The Commission also specified that power for 700 MHz public safety broadband operations must be measured in terms of average rather than peak values, resulting in a more accurate measure of the interference potential for wider band technologies.<sup>10</sup>

4. In this *Third Report and Order*, we maintain regulatory parity and extend relief recently afforded the 700 MHz Commercial Services Band and 700 MHz public safety broadband operations by adopting certain amendments to the PCS and AWS rules governing radiated power levels. We continue to believe that streamlining and harmonizing our rules will clarify spectrum rights and obligations for these WRS licensees, optimize flexibility for current and, more importantly, future WRS licensees, encourage the development of new technologies and services that will benefit the public, and fulfill our statutory mandate under Section 11 of the Communications Act of 1934, as amended (the Act).<sup>11</sup> Accordingly, in the PCS and AWS rules, we:

- Supplement the radiated power rules with a PSD model and specify licensee coordination requirements, while declining to double current radiated power levels prior to application of the PSD model; and
- Modify our rules to permit radiated power to be measured and expressed using average rather than peak values.

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<sup>8</sup> This approach to radiated power limits is based on “watts per megahertz of spectrum bandwidth,” rather than on a “watts per emission,” basis. In sum, maximum power levels increase proportionately with increased bandwidth.

<sup>9</sup> Service Rules for the 698-746, 747-762 and 777-792 MHz Bands, WT Docket No. 06-150, *Second Report and Order*, 22 FCC Rcd 15289, 15417 (2007) (*August 700 MHz Order*).

<sup>10</sup> *Id.*

<sup>11</sup> 47 U.S.C. § 161 (requiring the Commission to review biennially its regulations that are applicable to providers of telecommunications service in order to determine whether any rule is “no longer necessary in the public interest as the result of meaningful economic competition”).

5. For the reasons explained below, we decline to adopt similar modifications to the radiated power rules for other commercial services, including: Part 22 Cellular Radiotelephone Service, Part 27 2.3 GHz WCS, Part 27 2500 MHz Broadband Radio Service (BRS)/Educational Broadband Service (EBS), and the Part 27 1670-1675 MHz band. With respect to operations in the 1670-1675 MHz band, we do, however, address the existing waiver granted to OP LLC, a subsidiary of Crown Castle International Corp. (Crown Castle).<sup>12</sup>

## II. BACKGROUND

6. Since the release of two biennial review reports -- the *2000 Biennial Review Report*<sup>13</sup> and *2002 Biennial Review Report*,<sup>14</sup> the Commission has undertaken modification or repeal of certain regulations by issuing notices of proposed rulemakings.<sup>15</sup> In the Report and Order portion of the item adopted in this Docket on July 22, 2005 (*Streamlining R&O*), the Commission amended Parts 1, 22, 24, 27, and 90 of the rules to modify or eliminate certain provisions identified, in part, during the Commission's 2000 and 2002 biennial regulatory reviews.<sup>16</sup> As the Commission stated, while many of the amendments were "technical in nature and/or limited in application to a particular WRS, they nonetheless [were] consistent with our goal to harmonize rules and streamline the licensing obligations for all WRS licensees by eliminating unnecessary rules, as appropriate."<sup>17</sup>

7. The Commission deferred consideration of certain modifications to the radiated power rules and, under the Commission's general public interest standard, issued the *Further Notice*.<sup>18</sup> The Commission found that, while some aspects of the CTIA Proposal had "considerable merit," the Proposal raised issues that warranted further study and evaluation and a more comprehensive record to enable us to "craft a clear and workable radiated power rule that is

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<sup>12</sup> See discussion *infra* ¶¶ 52-55.

<sup>13</sup> See The 2000 Biennial Regulatory Review, CC Docket No. 00-175, *Report*, 16 FCC Rcd 1207 (2001) (*2000 Biennial Review Report*); see also Biennial Regulatory Review 2000, *Updated Staff Report* (rel. concurrently with the *2000 Biennial Review Report*); *id.* at Appendix IV: Rule Part Analysis.

<sup>14</sup> See The 2002 Biennial Regulatory Review, GC Docket No. 02-390, *Report*, 18 FCC Rcd 4726 (2003) (*2002 Biennial Review Report*); see also 2002 Biennial Regulatory Review, WT Docket No. 02-310, *Staff Report of the Wireless Telecommunications Bureau* (rel. concurrently with the *2002 Biennial Review Report*); *id.* at Appendix IV: Rule Part Analysis.

<sup>15</sup> In its *2002 Biennial Review Report*, the Commission clarified the scope and standard of review for future proceedings conducted pursuant to Section 11, acknowledging that it has broad discretion to review the continued need for any rule even in the absence of a congressional mandate such as Section 11. See *2002 Biennial Review Report*, 18 FCC Rcd at 4737.

<sup>16</sup> See *Streamlining R&O*, 20 FCC Rcd at 13901, 13904-23.

<sup>17</sup> *Id.* at 13904.

<sup>18</sup> The Commission eliminated the transmitter output power limits for broadband PCS systems, see *Streamlining R&O*, *id.* at 13910, while leaving intact the maximum EIRP limitations set forth in Section 24.232 of the Commission's rules, see *id.* at 13911. The Commission subsequently eliminated the transmitter output power limits for AWS systems in a separate proceeding. See Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands, WT Docket No. 02-353, *Order on Reconsideration*, 20 FCC Rcd 14058, 14080-81 (2005).

not unduly burdensome.”<sup>19</sup> Briefly stated, there are three components to the CTIA Proposal: (1) application of a PSD model to PCS/AWS radiated power levels; (2) a doubling of the current PCS/AWS radiated power limits as a baseline figure before applying a PSD model; and (3) the ability to meet the radiated power limits on an average, rather than peak, basis. More specifically, for PCS and AWS stations operating with an antenna height of up to 300 meters above average terrain, CTIA proposes that equivalent isotropically radiated power (EIRP) limits for base stations would be capped at the larger of either: (1) 1640 watts average EIRP for non-rural areas, 3280 watts average EIRP for rural areas (without application of a PSD model in either scenario); or (2) applying the PSD model, 3280 watts/MHz average EIRP for non-rural areas, 6560 watts/MHz average EIRP for rural areas.<sup>20</sup>

8. As explained in the *Further Notice*, we believe that the CTIA Proposal is appropriately evaluated in terms of its three independent but related components.<sup>21</sup> Accordingly, we sought comment on the application of a PSD model independent of any baseline changes to the numeric power limits recommended by CTIA. We also invited comment on the CTIA Proposal to increase the maximum radiated power for emissions at the wider bandwidths independently of implementing a PSD model.<sup>22</sup> Finally, we sought comment on the CTIA Proposal to permit licensees to meet the radiated power limits on an average, rather than peak, basis.<sup>23</sup>

9. The *Further Notice* also sought comment on alternatives to the CTIA Proposal, including “stepped” radiated power limits that might be simpler and accomplish the same objectives.<sup>24</sup> We expressed concern about how substantial changes to our radiated power rules might affect other related technical rules. For instance, we questioned whether the proposal would serve the purpose of balancing the interference potential of various known and future technologies, as well as the relative coverage or performance of wideband versus narrowband systems, and considered whether we should revise existing rules designed to limit interference.<sup>25</sup> Furthermore, as CTIA requested that the proposed changes be mirrored in the Part 27 rules governing AWS systems, we sought comment on whether we should adopt any or all of the proposed changes for AWS, as well as for other services, including the Part 22 Cellular Radiotelephone Service, Part 27 700 MHz<sup>26</sup> and/or 2.3 GHz WCS. We also specifically sought

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<sup>19</sup> *Further Notice*, 20 FCC Rcd at 13923.

<sup>20</sup> See generally CTIA Proposal.

<sup>21</sup> *Further Notice*, 20 FCC Rcd at 13924.

<sup>22</sup> *Id.* (citing CTIA Proposal at 2).

<sup>23</sup> *Id.* (citing CTIA Proposal at 5).

<sup>24</sup> *Id.* at 13928-29.

<sup>25</sup> *Id.* at 13924-25.

<sup>26</sup> As indicated above, see *supra* ¶ 2, we have adopted certain changes to the radiated power rules for the Lower and Upper 700 MHz Commercial Services bands and, accordingly, we do not address the 700 MHz bands in this *Third Report and Order*, nor do we list in Appendix B hereto submissions in the instant Docket (WT Docket No. 03-264) where parties limited their comments to the rules for the 700 MHz bands.

comment on possible application of the CTIA Proposal to the 1670-1675 MHz band in light of Crown Castle's request that the Commission increase power levels for stations operating in that band.<sup>27</sup>

10. Nine parties filed comments,<sup>28</sup> seven parties filed reply comments,<sup>29</sup> and six parties filed *ex parte* letters<sup>30</sup> in response to the *Further Notice*.

### III. DISCUSSION

11. Commenters generally supported the CTIA Proposal and its application to PCS and AWS, and did not oppose evaluation of the CTIA Proposal's three components individually, as described above.<sup>31</sup> We are adopting changes to our rules with respect to two of the three components of the CTIA Proposal. We address the proposal to implement a PSD model to the PCS and AWS radiated power rules in Section III.A, below. In Section III.B, we discuss the proposal to increase the maximum radiated power for wideband emissions, notwithstanding the implementation of a PSD model. In Section III.C, we address the measurement of radiated power in terms of average rather than peak values. In Section III.D, we explain our decision to apply the changes we adopt today only to PCS and AWS, as defined above, and, while declining to amend the radiated power rules applicable to the 1670-1675 MHz band, we discuss our decision to maintain the conditional waiver granted Crown Castle in February, 2007.

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<sup>27</sup> Crown Castle had pointed out that the 1670-1675 MHz band was not afforded relief in the Commission's 2004 decision to amend the radiated power rule for PCS, AWS and Cellular Radiotelephone Service to allow twice as much radiated power (3280 watts EIRP) for operations in rural areas. *See* Facilitating the Provision of Spectrum-Based Services to Rural Areas and Promoting Opportunities for Rural Telephone Companies to Provide Spectrum-Based Services, WT Docket No. 02-381, *Report and Order and Further Notice of Proposed Rulemaking*, 19 FCC Rcd 19078 (2004) (*Rural R&O*) (*cited in* Crown Castle *Ex Parte* Letter dated May 16, 2005 (Crown Castle 2005 Letter)). Rural areas are defined as those counties (or equivalent) with a population density of 100 persons per square mile or less, based upon the most recent available Census data. *See Rural R&O*, 19 FCC Rcd at 19087-88. *See also* 47 C.F.R. §§ 24.232(b) (PCS), 27.50(d)(1) (AWS) (permitting rural PCS and AWS stations to operate at higher power levels, subject to certain coordination requirements).

<sup>28</sup> *See* Comments filed Dec. 19, 2005, by: Crown Castle; CTIA; Ericsson Inc. (Ericsson); Motorola, Inc. (Motorola); the National Public Safety Telecommunications Council (NPSTC); Powerwave Technologies, Inc. (Powerwave); QUALCOMM Incorporated (Qualcomm); TerreStar Networks Inc. (TerreStar); and Wireless Communications Association International, Inc. (WCA).

<sup>29</sup> *See* Reply Comments filed Jan. 17, 2006, by: Crown Castle; Motorola; NPSTC; Qualcomm; Sprint Nextel Corporation (Sprint Nextel); and WCS Wireless, LLC jointly with XM Satellite Radio Holdings, Inc. (WCSW/XM).

<sup>30</sup> *See ex parte* submissions filed by: Aloha Partners, L.P. (Aloha); CTIA; Crown Castle; Ericsson; Sirius Satellite Radio Inc. (Sirius); and WCA.

<sup>31</sup> *See generally* Aloha *Ex Parte* Letter filed Jul. 18, 2006 (Aloha Letter); Crown Castle Comments; CTIA Comments; Ericsson Comments; Motorola Comments; Powerwave Comments. *See also* Qualcomm Comments (supporting use of PSD model and average measurement of power); Sprint Nextel Reply Comments (same); WCSW/XM Comments (same).

### A. Power Spectral Density (PSD) Model

12. *Background.* The current radiated power rules for PCS and AWS measure EIRP per emission, and limit base station power --- regardless of bandwidth size -- to 1640 watts peak EIRP for antenna heights up to 300 meters height above average terrain (HAAT) (3280 watts peak EIRP for rural areas).<sup>32</sup> CTIA states that the current rules favor narrowband emissions systems and penalize systems using wideband emissions.<sup>33</sup> According to CTIA, systems operating in narrower bandwidths are effectively permitted to operate with higher power spectral densities than those operating in wider bandwidths.<sup>34</sup> For example, a licensee deploying three 200 kHz GSM<sup>35</sup> emissions in a 1.25 MHz bandwidth could transmit up to three times the aggregate power of a licensee deploying a single 1.25 MHz CDMA<sup>36</sup> emission in the same bandwidth. CTIA contends that wideband technologies such as CDMA, Wideband-CDMA (WCDMA), or OFDM<sup>37</sup> are disadvantaged by the per-emission power constraint in the current rules.<sup>38</sup> CTIA's concerns echo comments submitted to us by other companies earlier in this proceeding.<sup>39</sup> CTIA proposes implementation of a PSD model with radiated power levels

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<sup>32</sup> See 47 C.F.R. §§ 24.232 (PCS), 47 C.F.R. § 27.50(d) (AWS). For antennas at HAATs greater than 300 meters, the maximum allowable EIRP for PCS stations is lower in accordance with tables found in Section 24.232 of our rules. See 47 C.F.R. § 24.232, Tables 1 and 2. With respect to AWS stations, there are no reductions in power limits for antennas with HAATs greater than 300 meters. As noted above, radiated power limits are higher in rural areas for PCS and AWS (among other services). See *Rural R&O*, *supra* note 27.

<sup>33</sup> CTIA Proposal at 2.

<sup>34</sup> *Id.*

<sup>35</sup> The Global System for Mobile Communication (GSM) is a narrowband cellular network technology that employs 200 kHz channels, each divided into 8 distinct time slots, thus shared by 8 users. See also *infra* note 38.

<sup>36</sup> Code Division Multiple Access (CDMA) is a wideband spread-spectrum technology that employs a special coding scheme, with each signal assigned a digital code. See also *infra* note 38.

<sup>37</sup> Orthogonal Frequency Division Multiplexing (OFDM) is a digital multi-carrier modulation scheme in which each signal is split into multiple smaller sub-signals that are then transmitted simultaneously at different frequencies to the receiver.

<sup>38</sup> CTIA Proposal at 2. The existing narrowband technologies -- GSM and Time Division Multiple Access (TDMA) (which, like GSM, divides channels into time slots) -- carry 8 and 3 voice conversations, respectively, per emission, compared to wideband technologies such as CDMA, which carry as many as 20 to 40 voice conversations per emission. See *Further Notice*, 20 FCC Rcd at 13927. Under the current rule, therefore, assuming systems are fully loaded and operating at the maximum power permitted by rule, wideband emission systems can only provide about one-fifth of the radiated power per voice conversation, as compared to narrowband emission systems. Hence, as stated in the *Further Notice*, "the average voice conversation on the wide emission system would have a lower signal-to-noise ratio, which, despite the partially compensating processing gain provided by signal spreading, would reduce the coverage range." *Id.* For data transmissions, a reduced signal-to-noise ratio could result in a lower data throughput. See *id.* (citing Qualcomm White Paper, "1xEV: 1x Evolution IS-856 TIA/EIA Standard, Airlink Overview," dated Nov. 7, 2001, at 10).

<sup>39</sup> As discussed in the *Further Notice*, in the context of achieving a more technology neutral transmitter power output rule, the Commission had asked for comments on a PSD limit in the *Notice of Proposed Rulemaking* issued in 2004 in the instant Docket (WT Docket No. 03-264). See *The Biennial Regulatory Review -- Amendment of Parts 1, 22, 24, 27, and 90 to Streamline and Harmonize Various Rules Affecting Wireless Radio Services*, WT (continued....)

calculated on a “watts-per-MHz” basis, yielding power limits that increase proportionally with bandwidth. CTIA asserts that this proposal would not only address the broadly-recognized need to “level the playing field” for wideband emissions systems, but would also facilitate deployment of wideband technologies and result in lower costs.<sup>40</sup>

13. We acknowledged the industry’s concerns about the current EIRP rule and agreed that the PSD model has merit. As we stated in the *Further Notice*, “the Commission seeks to promulgate rules that are ‘technology neutral’ because we believe that ideally it is in the public interest for competing telecommunications technologies to succeed or fail in the marketplace on the basis of their merits and other market factors, and not primarily because of government regulation.”<sup>41</sup> The CTIA Proposal nonetheless raised various concerns. For example, it left unresolved the issue of whether systems using narrowband emissions (such as GSM and TDMA) would be capped at an EIRP below what is permitted by the current rule.<sup>42</sup> It was not our intent to reduce the radiated power limits for narrowband systems, and thus we noted our assumption that the current radiated power limits (1640 watts EIRP non-rural, 3280 watts EIRP rural) would be unchanged for narrowband emission types.<sup>43</sup> However, in seeking comment, we asked whether the PSD feature should be applied for narrowband emissions as well as wideband emissions.<sup>44</sup>

14. We also expressed concern about the PSD model’s potential to result in increased interference, given that the practical impact of PSD is to allow proportionally more radiated power for wideband systems.<sup>45</sup> We questioned whether the CTIA Proposal is so complex that it might lead to “practical difficulties in compliance.”<sup>46</sup> In addition, we asked for comment on whether the PSD model might “inadvertently affect new and evolving technologies unequally,” a result that is contrary to our interest in establishing rules that are technology neutral wherever possible.<sup>47</sup>

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Docket No. 03-264, *Notice of Proposed Rulemaking*, 19 FCC Rcd 709 (2004) (*2004 Streamlining NPRM*). In response, the Commission received comments not only from CTIA, but also from certain individual companies. See *Further Notice*, 20 FCC Rcd at 13926-27 (discussing comments filed in response to the *2004 Streamlining NPRM*).

<sup>40</sup> See CTIA Proposal at 1.

<sup>41</sup> *Further Notice*, 20 FCC Rcd at 13926.

<sup>42</sup> Applying the PSD calculation to narrowband operations would in some cases yield EIRP limits lower than the current EIRP rule’s limits. See, e.g., Ericsson Comments at 11.

<sup>43</sup> See *Further Notice*, 20 FCC Rcd at 13927 (not taking into account CTIA’s proposal to double the current base station power limits).

<sup>44</sup> See *id.*

<sup>45</sup> See *id.* at 13924-25.

<sup>46</sup> *Id.* at 13924.

<sup>47</sup> *Id.* at 13926 (recognizing that it may not always be possible to avoid a rule that, because of the technological circumstances at the time, may cause harmful interference or otherwise adversely affect “new and evolving technologies unequally”).

15. In the *Further Notice*, we also stated that a rule that sets a different radiated power limit for wide emissions than for narrow emissions “must define which emissions types are wide and which are narrow, and the basis for that classification.”<sup>48</sup> Systems using emissions that have a bandwidth wider than 1 MHz, we observed, generally use their entire spectrum contiguously in each cell, whereas systems using emissions with a bandwidth less than 1 MHz use, at each cell, a number of narrower channels separated by several channels not used in that cell.<sup>49</sup> We explained our belief that if a technology is developed using 500 kHz-1 MHz bandwidth, the technology is more likely to use different channels at different cells like other narrowband systems, rather than a spread-spectrum approach as is typically used in wideband systems. The *Further Notice* invited comment on whether we should use 500 kHz, 1 MHz, or some other emission bandwidth as the dividing point between narrow and wide emissions in conjunction with adoption of a PSD model.<sup>50</sup>

16. Finally, in the *Further Notice*, we observed that implementation of the PSD model as proposed by CTIA “would define power limits based on a sliding scale with a potentially infinite number of linear scaled limit values.”<sup>51</sup> We therefore sought comment on a “stepped” approach, establishing specific power limits for particular bandwidth ranges, as an alternative to CTIA’s proposed sliding scale approach.<sup>52</sup> We asserted that a stepped approach could easily be codified in table form, and provided illustrations. We offered variations of our suggested alternative approach involving stepped limits,<sup>53</sup> and invited comment on these and any other alternatives in addition to CTIA’s preferred sliding scale watts-per-MHz approach.

17. In response to the *Further Notice*, commenters echo CTIA’s complaint that the current rules penalize wideband systems over more narrow ones, and endorse use of a PSD model and urge its adoption to “level the playing field.”<sup>54</sup> According to Qualcomm, technology

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<sup>48</sup> *Id.* at 13928.

<sup>49</sup> *Id.*

<sup>50</sup> *See id.*

<sup>51</sup> *Id.* at 13927 (noting that radiated power is calculated by measuring the radiofrequency (RF) power at a convenient point in the transmission line between the transmitter and the antenna feed line, subtracting the specified system losses, and adding the specified maximum antenna gain).

<sup>52</sup> We suggested that the stepped approach could be set forth in a table to make clear what limit is applicable in any given instance, and we provided possible scenarios depicted in table format, noting the difficulties presented by use of graphical curves (*e.g.*, for antenna height power reduction). *See Further Notice*, 20 FCC Rcd at 13927. In suggesting a simpler alternative, we analogized to highway speed limits: rather than adopting a “mph per ton of vehicle” ratio that would likely result in a different individual speed limit being applicable to each model of car or truck in accordance with weight, two speed limits might be posted -- one for automobiles and another for heavier vehicles such as trucks – in the interest of highway safety. *See id.* at 13928-29.

<sup>53</sup> *Id.* at 13929.

<sup>54</sup> CTIA Comments at 1. *See, e.g.*, Motorola Comments at 2-3; Qualcomm Comments at 2, and its Reply Comments at 1-2; Ericsson Comments at 12; Aloha Letter at 1; Crown Castle Reply Comments at 2 (reiterating its specific request that the Commission adopt PSD limits also for the 1670-1675 MHz band, discussed further in Section III.D, *infra*).

neutrality adopted around the world has “enabled advanced, spectrally efficient CDMA technology to develop and flourish.”<sup>55</sup> Qualcomm claims that CDMA technology is now the basis for the latest generation, the third generation of modern wireless services, and that there is no reason to disfavor systems based on this technology in base station power limits.<sup>56</sup> Sprint Nextel contends that the current rules “may unfairly restrict the deployment of wideband technologies by requiring more new cell sites than necessary or reducing coverage areas from the same number of sites as deployed in today’s cellular systems.”<sup>57</sup> Furthermore, it argues, while other power limit measurements are possible, a “watts-per-megahertz approach is one absolute measurement that is relatively easy to derive.”<sup>58</sup>

18. In concurring that PSD limits are technology neutral, Powerwave adds that the PSD technique will provide licensees using or migrating to wideband schemes with sufficient “flexibility to bring newly emerging video and high speed data services to market.”<sup>59</sup> According to Powerwave, “[u]nless power levels are indexed to the expanding bandwidths required for new mobile offerings, licensees that are operating on fixed carrier power will be forced either to serve fewer subscribers or to reduce their areas of coverage.”<sup>60</sup> While Powerwave states it is possible to maintain subscribers and coverage areas by “increasing the number of base stations or creating small cell sites,” it contends this option is not viable because it would require re-configuring the existing cellular infrastructure – a prohibitively costly venture for “most licensees,” further compounded in some cases by “contentious zoning issues” that arise for tower construction.<sup>61</sup>

19. CTIA emphasizes that rural areas are particularly affected by the current rules that “artificially constrain more modern technologies . . . that increase network efficiency and decrease the cost of deploying new services by expanding coverage over larger areas.”<sup>62</sup> It notes that “many GSM/TDMA providers are or soon will be evolving their networks to WCDMA.”<sup>63</sup> By restricting permissible power levels of a wider band offering such as WCDMA, CTIA argues, the current rules force providers either to “reduce[e] the coverage area under the current base station configuration or . . . obtain new cell sites in order to match existing coverage.”<sup>64</sup>

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<sup>55</sup> Qualcomm Comments at 8.

<sup>56</sup> *Id.*

<sup>57</sup> Sprint Nextel Reply Comments at 5.

<sup>58</sup> *Id.*

<sup>59</sup> Powerwave Comments at 2-3.

<sup>60</sup> *Id.* at 4.

<sup>61</sup> *Id.*

<sup>62</sup> CTIA Comments at 2, 5.

<sup>63</sup> *Id.* at 5.

<sup>64</sup> *Id.*

20. With regard to narrow emissions systems, CTIA acknowledges as legitimate the concern that, with implementation of a pure watts-per-MHz power limit, narrowband service operators would be subject to a lower power limit under the proposed rule than what is permitted under the current rule.<sup>65</sup> As Ericsson also states: “Requiring a GSM system that can operate multiple carriers in a single MHz to comply with the same [watts-per-MHz] limit applied to broadband systems would force these carriers to operate at a fraction of the power permitted for broadband.”<sup>66</sup> To address this concern, rather than drawing any specific line between narrowband and wideband emissions, CTIA proposes what it calls a “savings clause provision for narrowband emissions” – which it alleges is a simpler solution that avoids disrupting operations involving existing narrowband technologies.<sup>67</sup> Specifically, it proposes to permit licensees to choose the larger of: (a) the existing rule’s power limit; or (b) a PSD watts-per-MHz limit.<sup>68</sup> CTIA claims that under such a rule, “narrowband emissions such as AMPS or GSM would be treated as they are today without a concern that a watts-per-MHz limit could lower existing permitted radiated power limits.”<sup>69</sup>

21. Commenters generally agree with giving narrowband operators a choice.<sup>70</sup> Ericsson states that “modifying narrowband emissions limits strictly based on a PSD model and implementing varying limits for different narrow bandwidths could adversely impact these systems and . . . result in the reverse effect of the current rule.”<sup>71</sup> Commenters do not all agree with the Commission’s proposal to establish a dividing point between narrowband and wideband emissions for purposes of allowing use of PSD. According to Ericsson, for example, a demarcation point or eligibility test like the one described in the *Further Notice* is “unnecessarily restrictive and could actually undermine the goals of the CTIA Proposal.”<sup>72</sup> On the other hand, Motorola and Powerwave indicate their support for allowing stations with bandwidths of greater than a specified amount to be governed by PSD limits, while allowing stations with bandwidths below the dividing line to operate at 1640 watts maximum per emission, as they do at present.<sup>73</sup>

22. With regard to our concerns about CTIA’s proposed sliding scale approach, CTIA responds that a pure watts-per-MHz approach is forward-looking, easily understood within the

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<sup>65</sup> *Id.* at 9.

<sup>66</sup> Ericsson Comments at 12.

<sup>67</sup> CTIA Comments at 8.

<sup>68</sup> *Id.* at 9.

<sup>69</sup> *Id.*

<sup>70</sup> See, e.g., Crown Castle Comments at 5; Ericsson Comments at 11, 13; Powerwave Comments at 2; Sprint Nextel Reply comments at 4 n.10.

<sup>71</sup> Ericsson Comments at 11.

<sup>72</sup> Ericsson *Ex Parte* Letter dated Mar. 29, 2006 (Ericsson Letter) at 2.

<sup>73</sup> See Powerwave Comments at 4; Motorola Comments at 3 (noting it had previously recommended that the PSD formula be applied to emissions exceeding 1 MHz, but that a 500 kHz cut-off is also acceptable).

industry and would not result in the complexity that the Commission fears.<sup>74</sup> The calculation, it contends, is simple, straightforward and technology neutral. CTIA states that equipment manufacturers and spectrum licensees who would be subject to the radiated power rules are sophisticated entities engaged in the technology world, and it is “highly unlikely” that a wireless service provider would be unaware of the emissions bandwidth operating on its own system.<sup>75</sup> CTIA opposes the stepped approach described by the Commission, claiming that it entails arbitrary line drawing “that could hamper future technologies.”<sup>76</sup>

23. Commenters unanimously favor adoption of the system proposed by CTIA for PCS and AWS based purely on watts per MHz; none endorses a system of fixed (stepped) power levels. Motorola, for example, believes that the potential for confusion arising from use of the sliding scale approach is “overstated and, in any event, does not supersede the importance of developing a technology-neutral approach.”<sup>77</sup> While the “stepped” framework may serve the industry’s current needs, Ericsson observes, it will not provide flexibility to allow for future technological developments.<sup>78</sup> According to Ericsson, the stepped approach entails “unnecessary regulation” while CTIA’s sliding scale proposal will provide an “optimal range of flexibility in which existing technologies may operate and new technologies emerge” - with resulting benefits to wireless consumers.<sup>79</sup> Ericsson anticipates that a rule based on fixed steps would likely require that a new limit be added to the series for each new technology, “forcing needless delays in introduction of new technologies and creating additional regulatory uncertainty.”<sup>80</sup>

24. *Discussion.* Consistent with our decision in the *April 700 MHz Order*, and based on the record developed in response to the *Further Notice* in Docket 03-264, we adopt a PSD model for defining EIRP limits for PCS and AWS base stations. As noted in the *April 700 MHz Order*, we believe that this model will better accommodate newer technologies employing wider bandwidths -- by establishing EIRP caps on a “per megahertz of spectrum bandwidth” basis rather than on a “per emission” basis.<sup>81</sup> We find that a stepped approach is not warranted, and

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<sup>74</sup> CTIA Comments at 8-9.

<sup>75</sup> *Id.*

<sup>76</sup> *Id.*

<sup>77</sup> Motorola Comments at 3. *See also* Powerwave Comments at 6. Motorola asserts that establishing a series of fixed EIRP maximums “would, inevitably, handicap some future technology designs with bandwidths on the ‘wrong-side’ of the demarcation lines,” and would require modifications as broader band technologies emerge. Motorola Comments at 3.

<sup>78</sup> Ericsson Comments at 14.

<sup>79</sup> *Id.* at 2, 13.

<sup>80</sup> *Id.* at 14. Powerwave states that, over time, the list of fixed power limits corresponding to some known emission bandwidths “may also become infinite as technologies evolve,” and states that the Commission’s suggested stepped approach is “inherently less flexible” and “becomes inherently arbitrary.” Powerwave Comments at 3, 6.

<sup>81</sup> *See April 700 MHz Order*, 22 FCC Rcd at 8098-99 (stating that a power limit that is construed to apply on a per-emission basis “could allow licensees employing multiple emissions to transmit more total energy in their authorized spectrum blocks than licensees with only one emission in their spectrum blocks”).

we agree with CTIA and other commenters that application of a sliding scale, watts-per-MHz approach to radiated power in these flexible bands is more likely to encourage innovation and will not require modifications as new technologies emerge.

25. Based on our finding that narrowband licensees should not be required to operate below current EIRP limits, we establish a bandwidth dividing line for purposes of applying PSD in the modified rule. Consistent with our recent amendments to our radiated power rules in the *April 700 MHz Order* (regarding the 700 MHz Commercial Services band)<sup>82</sup> and the *August 700 MHz Order* (regarding public safety broadband operations),<sup>83</sup> we will allow PCS and AWS licensees employing bandwidths greater than 1 MHz to meet a base station power limit of 1640 watts/MHz EIRP (*i.e.*, no more than 1640 watts EIRP in any 1 MHz band segment). PCS and AWS licensees operating with bandwidths of less than 1 MHz will, however, continue to be permitted to operate at power levels up to 1640 watts EIRP over their bandwidth. Thus, for example, a licensee transmitting a signal with a bandwidth of 5 MHz could employ a power level of 8200 watts EIRP over the 5 MHz bandwidth, with each 1 MHz band segment within the 5 MHz bandwidth being limited to 1640 watts EIRP; and a licensee transmitting a signal with a bandwidth of 200 kHz could employ a power level of 1640 watts EIRP over the 200 kHz bandwidth. As we stated in the *April 700 MHz Order*, this approach to defining power limits “will achieve a degree of technological neutrality by ensuring that all licensees regardless of technology will have enough power to operate a viable service.”<sup>84</sup> Consistent with the current PCS and AWS rules, licensees will be permitted in rural areas to operate at double the non-rural power limit, subject to the new PSD model, *i.e.*, the rural radiated power limit is increased from 3280 watts EIRP to 3280 watts/MHz EIRP.<sup>85</sup> Today’s action will not only provide flexibility for licensees employing wideband technologies used to provide advanced, high speed wireless services, but also will potentially reduce infrastructure costs, thereby increasing the provision of service to rural areas.

26. Coordination. As noted above, the current radiated power rules for PCS and AWS permit a doubling of the limits for systems operating in rural areas, subject to certain coordination requirements.<sup>86</sup> In order to balance the need for licensee flexibility with our concern for limiting potential increased interference from higher power wideband operations, we will require rural PCS and AWS licensees operating at greater than 1640 watts EIRP and greater than 1640 watts/MHz EIRP to coordinate with adjacent block licensees in their respective

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<sup>82</sup> *See id.* at 8099.

<sup>83</sup> *August 700 MHz Order*, 22 FCC Rcd at 15417. We recently sought comment in the pending AWS-3 proceeding on whether to apply PSD to radiated power limits in that spectrum block. *See Service Rules for Advanced Wireless Services in the 2155-2175 MHz Band*, WT Docket No. 07-195, *Notice of Proposed Rulemaking*, 22 FCC Rcd 17035, 17064 (2007).

<sup>84</sup> *April 700 MHz Order*, 22 FCC Rcd at 8099.

<sup>85</sup> *See* 47 C.F.R. §§ 24.232(b), 27.50(d)(1). As discussed above, these rules were amended in 2004 to provide significant relief to rural licensees operating in various bands. *See Rural R&O*, *supra* note 27.

<sup>86</sup> *See* 47 C.F.R. §§ 24.232(b) (PCS), 27.50(d)(1) (AWS). *See also Rural R&O*, 19 FCC Rcd at 19134.

services that are authorized to operate within 75 miles of the transmitting base station. Further, consistent with our current rules:<sup>87</sup> (1) PCS rural operation greater than 1640 watts EIRP and greater than 1640 watts/MHz EIRP will be limited to base stations located more than 120 kilometers (75 miles) from the Canadian border and more than 75 kilometers (45 miles) from the Mexican border; and (2) AWS rural stations operating at greater than 1640 watts EIRP and greater than 1640 watts/MHz EIRP will be required to coordinate in advance with all Government and non-Government satellite entities in the 2025-2110 MHz band and with all BRS licensees authorized under Part 27 in the 2155-2160 MHz band.

## B. Proposed Increases to Maximum Radiated Power Levels

27. *Background.* In its Proposal, CTIA requests a doubling of the maximum radiated power permitted for both PCS stations and AWS stations *prior* to the application of a PSD model, resulting in an initial EIRP limit increase, before proportional power increases for larger bandwidth operations, from 1640 watts to 3280 watts in non-rural areas and from 3280 watts to 6560 watts in rural areas.<sup>88</sup>

28. In the *Further Notice*, the Commission expressed certain concerns with a doubling of both non-rural and rural radiated power limits, noting that as recently as 2004, we had doubled the then-existing 1640 watt EIRP limit for rural systems operating in various radio services, including PCS and AWS. In the interest of establishing flexible power rules that also reflect realistic power levels, we questioned whether existing licensees “use as much radiated power in their systems as is permitted” by the current rule.<sup>89</sup> We specifically asked that commenters supporting the CTIA Proposal “provide examples of actual situations in which licensees could beneficially use radiated power levels on the order of what [was] being proposed” by CTIA as well as other parties who submitted comments earlier in this proceeding.<sup>90</sup>

29. In addition, we asked whether the current limits have caused particular problems that could be solved by the proposed increases. We also expressed concern that increased radiated power might cause new problems in terms of harmful interference to adjacent spectrum users, and asked commenters to consider this as well as possible enhancements to coordination and/or notification measures to minimize instances of harmful interference.<sup>91</sup> Finally, because PCS systems are, like other wireless systems, subject to certain restrictions governing human exposure to RF emissions, we sought comment on whether doubling the EIRP limits (which, for rural areas, would mean a quadruple increase from pre-2004 levels, given our action in the *Rural*

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<sup>87</sup> See 47 C.F.R. §§ 24.232(b) (PCS), § 25.50(d) (AWS).

<sup>88</sup> CTIA Proposal at 2. CTIA’s proposal for increased power would only apply to stations operating with antennas at an HAAT of up to 300 meters; the reduced EIRP levels for stations with antennas at HAATs greater than 300 meters would continue to be calculated based on current EIRP limits, *i.e.*, 1640 watts in non-rural areas, and 3280 watts in rural areas. *Id.*

<sup>89</sup> *Further Notice*, 20 FCC Rcd at 13930.

<sup>90</sup> *Id.*

<sup>91</sup> *Id.*

R&O) would potentially increase the number of filings required for proper evaluation of facilities' compliance with our environmental regulations.<sup>92</sup>

30. Parties' comments on this issue in response to the *Further Notice* support the CTIA Proposal to modify the rule to permit doubling of radiated power limits for PCS and AWS.<sup>93</sup> Motorola asserts that such changes "will increase licensee flexibility and promote technology neutrality,"<sup>94</sup> while CTIA states that increasing radiated power merely "evens the playing field between narrowband and wideband emissions."<sup>95</sup> According to Ericsson, EIRP limits dictate how operators may construct their systems – including how many transmitter sites to install to cover a particular area with an acceptable signal-to-noise ratio.<sup>96</sup> It argues that increasing EIRP limits will provide added flexibility by allowing operators to be "more selective in their site locations and install fewer transmitters where use of higher power is feasible, lowering the cost of deploying a network or increasing coverage."<sup>97</sup> In addition, Ericsson contends, the proposed changes in the EIRP limits will enable operators to improve coverage by using higher power in locations where installing additional transmitters is impossible or impractical, and argues that this is especially relevant in rural areas: the increased limits "will allow rural operators to expand the reach of existing systems without adding infrastructure and will reduce the number of transmitting facilities required to provide service."<sup>98</sup> Powerwave states that the current limits were established before "mobile video and high speed data were . . . on anyone's 'drawing board' [and the rules] no longer serve the needs of licensees who are beginning to offer these new, spectrum-intensive services."<sup>99</sup>

31. *Discussion.* For the reasons discussed below, we decline at this time to double PCS and AWS non-rural radiated power limits, or further double PCS and AWS rural radiated power limits. Although commenters generally favor doubling the current PCS and AWS

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<sup>92</sup> *Id.* at 13930-31.

<sup>93</sup> See, e.g., Motorola Comments at 2-3; Ericsson Comments at 6-7; Sprint Nextel Reply Comments at 2; Powerwave Comments at 3-4. We note that TerreStar urged that "if the Commission decides to increase permitted power in the H-block, it should correspondingly increase the size of the guard band" to protect TerreStar's planned service in the 2 GHz band. TerreStar Comments at 2-3. This *Third Report and Order* does not address the H-Block, and hence TerreStar's concerns are better considered in a separate proceeding. See also discussion *infra* ¶ 51. We also note that NPSTC raises concerns about public safety, but states that its concerns "relate not to the broadband PCS and other bands where there are no adjacent public safety operations . . ." NPSTC Comments at 4.

<sup>94</sup> Motorola Comments at 2-3. See also Powerwave Comments at 3 (stating that the CTIA Proposal "constitutes a balanced approach that is technologically neutral").

<sup>95</sup> CTIA Comments at 6.

<sup>96</sup> See Ericsson Comments at 6.

<sup>97</sup> *Id.*

<sup>98</sup> *Id.* (claiming also that higher EIRP limits will benefit operators and consumers in urban areas through improved coverage in hard to reach areas, such as the lower and inner reaches of buildings, parking garages, subway systems, and other subterranean or dense construction).

<sup>99</sup> Powerwave Comments at 6.

radiated power limits as urged in the CTIA Proposal, we did not receive comments on this issue responsive to concerns raised in the *Further Notice*, particularly regarding the potential for unnecessarily increasing the risk of interference to adjacent spectrum users.<sup>100</sup> In addition, no commenters justify a need for doubling radiated power levels independent of implementing a PSD model, which we are adopting today. With respect to rural operations, commenters do not demonstrate that rural systems have been deployed taking full advantage of the recently doubled rural radiated power limits and that, notwithstanding such increased power,<sup>101</sup> rural coverage is inadequate. As noted above, we did not receive comments that contained specific examples of problems caused by the current EIRP limits that could be solved by increasing the limits. We believe that adoption of the PSD model is forward looking and will foster broadband development, and will permit licensees deploying WCDMA, for example, to operate at up to 8200 watts EIRP (non-rural) and 16,400 watts EIRP (rural).<sup>102</sup> Moreover, we note that some commenters expressly recognize that today's technologies do not fully utilize the proposed higher power rates,<sup>103</sup> and the record does not reflect that today's PCS systems, for example, use the full radiated power currently provided under our existing rules.

32. Based on the record in this proceeding, and taking into account our adoption of the PSD model for wideband operations, we find no justification for a baseline doubling of EIRP limits for PCS or AWS base stations at this time. We conclude that the Commission and industry should be afforded time to gain experience with, and assess the effect of, the PSD model we adopt today. As we observed in the *Further Notice*, supplementing the EIRP rule with the PSD model is a “fundamental shift in how base station transmitter power limits are determined.”<sup>104</sup> Moreover, our decision declining to further increase radiated power limits independent of a PSD model is consistent with the Commission's recent action in the *April 700 MHz Order* in this Docket implementing PSD for 700 MHz Commercial Services Bands, as well as the Commission's *August 700 MHz Order*, which implemented a PSD model for public safety broadband operations.<sup>105</sup> Our action today is therefore consistent with our objective to harmonize our rules where possible across similar services.

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<sup>100</sup> Except for Crown Castle, commenters also did not address our inquiries about potentially increased burdens regarding compliance with the Commission's environmental regulations. See discussion *supra* ¶ 29. CTIA had stated its belief that there would be no significant increase in the number of facilities requiring full evaluation, and Crown Castle agrees. See CTIA Proposal at 11; Crown Castle Reply Comments at 4-5. We are not changing our environmental regulations in conjunction with the EIRP rule changes we adopt today. Licensees will remain subject to the current evaluation and filing requirements. See also *infra* note 143 and accompanying text.

<sup>101</sup> See *supra* note 27.

<sup>102</sup> Under our existing rules, licensees deploying WCDMA systems are limited to 1640 watts EIRP (non-rural) and 3280 watts EIRP (rural).

<sup>103</sup> See, e.g., Ericsson Comments at 7-8.

<sup>104</sup> *Further Notice*, 20 FCC Rcd at 13912.

<sup>105</sup> In implementing a PSD model for 700 MHz Commercial Services Band radiated power, we stated that CTIA “provides no justification for permitting an unrestricted doubling of power levels for the 700 MHz Commercial (continued....)”

### C. Peak vs. Average Radiated Power Limits

33. *Background.* The Commission's PCS and AWS rules currently limit permissible radiated power on a peak basis.<sup>106</sup> Section 24.232(a), for example, states that PCS "[b]ase stations are limited to 1640 watts peak" EIRP.<sup>107</sup> Similarly, Section 27.50(d)(1) limits the peak EIRP of AWS base stations in the 2110-2155 MHz band to 1640 watts.<sup>108</sup> CTIA urged in its proposal that we amend these rules and specify power limits on an average rather than peak basis.<sup>109</sup> CTIA asserted that the "peak" terminology in our rules is subject to varying interpretation, and that adopting average power limits for base stations would remove uncertainty and facilitate the deployment of broadband technologies.<sup>110</sup>

34. We sought comment on the CTIA Proposal in the *Further Notice*.<sup>111</sup> We noted that for most of the past 50 years, wireless services, such as land mobile services, used frequency or phase modulation (FM or PM) technologies, which produce emissions with a constant envelope,<sup>112</sup> where peak and average power are equal.<sup>113</sup> We also noted that pursuant to the Commission's flexible technical rules, licensees more recently have deployed "digital technologies, many of which produce an emission where the modulation envelope is not of constant amplitude."<sup>114</sup> A number of these newer technologies, such as OFDM, produce an emission with sub-microsecond power spikes, and its peak power therefore is always higher, often significantly, than its average power.

35. Receivers begin to exhibit the effects of harmful interference when the power of an undesired signal reaches a certain threshold value. As we explained in the *Further Notice*, the Commission had adopted peak power limits because "peak radiated power of [an] emission can

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Services Band, and we find no basis for adopting such limits for the band." *See April 700 MHz Order*, 22 FCC Rcd at 8103.

<sup>106</sup> *See* 47 C.F.R. § 24.232 (PCS power limits); 47 C.F.R. § 27.50(d) (AWS power limits). Peak power, also known as "peak envelope power," is defined as "[t]he average power supplied to the antenna transmission line by a transmitter during one radio frequency cycle at the crest of the modulation envelope taken under normal operating conditions." *See* 47 C.F.R. § 2.1.

<sup>107</sup> 47 C.F.R. § 24.232(a).

<sup>108</sup> 47 C.F.R. § 27.50(d)(1).

<sup>109</sup> *See* CTIA Proposal at 5. Average power, also known as "mean power," is defined as "[t]he average power supplied to the antenna transmission line by a transmitter during an interval of time sufficiently long compared with the lowest frequency encountered in the modulation taken under normal operating conditions." *See* 47 C.F.R. § 2.1.

<sup>110</sup> *See* CTIA Proposal at 5. Alternatively, CTIA argues that we should eliminate the term "peak" from the PCS and AWS base station power rules to achieve the same ends. *Id.*

<sup>111</sup> *Further Notice*, 20 FCC Rcd at 13931-32.

<sup>112</sup> A waveform with a constant envelope has no peaks or valleys.

<sup>113</sup> *Further Notice*, 20 FCC Rcd at 13931. Because peak and average power were equal, it was unnecessary for the Commission to specify average or peak power in the related rules. *See id.*

<sup>114</sup> *Id.*

be an important factor in evaluating the interference potential of a transmitting station.”<sup>115</sup> We observed that if the Commission were to limit power on an average basis as CTIA proposes, peak emissions could be much higher than currently permitted under the Commission’s rules, resulting in an increased risk of interference. We thus sought comment as to whether we should “guard against interference” by adopting a peak-to-average power limit ratio (PAR), which would limit the magnitude of power spikes, in the event we adopt the use of average power limits.<sup>116</sup>

36. Commenting parties generally support modification of the PCS and AWS rules to limit power on an average basis, noting that industry standards widely use average rather than peak EIRP emissions measurements.<sup>117</sup> Motorola, for example, states that “the measurement of average values with non-constant envelope technologies avoids the possibility that impulse-like transient surges of extremely short-durations will unnecessarily govern the operating power of such stations.”<sup>118</sup> Ericsson concurs that an average power limit approach “provides more accurate and relevant information on output and a more accurate picture of power in the band.”<sup>119</sup> Ericsson also observes that a peak approach “artificially assigns a much higher power measurement in the band than levels typically observed during actual operation . . . .”<sup>120</sup> Similarly, Sprint Nextel asserts that application of peak power limits to “CDMA, W-CDMA and OFDM and related modulation techniques . . . could require an inequitable and unnecessary reduction of the overall channel power due solely to errant spikes of power of extremely short duration.”<sup>121</sup>

37. Ericsson further contends that application of peak power limits to non-constant envelope technologies disadvantages such technologies because operators must decrease station average output power to meet the peak limits, thereby reducing coverage and capacity of cell sites.<sup>122</sup> Stated differently, in being required to employ peak power limits, network operators must, according to Ericsson, build additional sites to provide the same level of coverage. Ericsson asserts that limiting base station power on an average basis would be technology neutral

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<sup>115</sup> *Id.*

<sup>116</sup> *Id.*

<sup>117</sup> See, e.g., Ericsson Comments at 14-19; Motorola Comments at 4 (describing average output power approach as “consistent with most standards specifications used to determine interoperability between various technologies to ensure co-existence”); Qualcomm Reply Comments at 4. CTIA reiterates that this modification would keep the rules “in step with developments in technology and industry practice.” CTIA Comments at 9. See also Aloha Letter at 1-2. *But cf.* WCA Comments at 3-4 (opposing application of average power limits to BRS and EBS because the Commission has adopted rules under which the maximum average EIRP varies with channel bandwidth and antenna beamwidth).

<sup>118</sup> Motorola Comments at 4.

<sup>119</sup> Ericsson Comments at 16.

<sup>120</sup> *Id.*

<sup>121</sup> Sprint Nextel Reply Comments at 5 (*but see infra* notes 136-137 and accompanying text).

<sup>122</sup> Ericsson Comments at 16.

because power limits would be “independent of the underlying radio access technology used.”<sup>123</sup> Ericsson also notes that the Commission’s PCS rules specify that EIRP levels be measured on a peak basis<sup>124</sup> but require instrumentation calibrated in terms of Root-Mean-Square-voltage (an averaging method) and argues that this inconsistency has caused industry to interpret our rules to limit average power.<sup>125</sup> Ericsson concludes that adopting average power limits will eliminate this ambiguity, conform the Commission’s rules to industry standards based on average emission limits,<sup>126</sup> and provide industry with regulatory certainty.

38. Although CTIA proposes that we apply average power limits to PCS and AWS base stations only, Ericsson urges us to review whether to apply average power limits to PCS and AWS hand-held units as well.<sup>127</sup> Ericsson claims that average power limits for such devices are warranted “for the same reasons as the base station rules.”<sup>128</sup> According to Ericsson, applying average power limits to hand-held units “will not lead to use of excessive power” because “[m]arket forces . . . drive equipment manufacturers to select modulations with minimal PAR and incorporate peak reduction techniques to minimize . . . power consumption for mobile units, just as for base stations.”<sup>129</sup> Motorola concurs with Ericsson so long as the Commission specifies that average power limits must be measured “during active transmission time.”<sup>130</sup> In urging the Commission to “proceed cautiously in applying the proposed average measurement techniques,” Sprint Nextel references “handsets” as well.<sup>131</sup> Other commenters did not address this issue.

39. Peak-to-Average Ratio: Several parties claim that a PAR limit is unnecessary to protect against potential harmful interference, arguing that manufacturers and operators voluntarily minimize PAR to help reduce equipment costs and achieve more efficient operations.<sup>132</sup> According to Qualcomm, the Commission’s out-of-band emission (OOBE) limits

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<sup>123</sup> *Id.* at 17.

<sup>124</sup> *See* 47 C.F.R. § 24.232(a).

<sup>125</sup> *See* Ericsson Comments at 17.

<sup>126</sup> *See id.* at 18 (noting equipment specifications based on average power).

<sup>127</sup> *Id.* *See* 47 C.F.R. §§ 24.232(c) (stating that “[m]obile/portable stations are limited to 2 watts EIRP peak power . . .”) (for PCS); 27.50(d)(2) (stating that “[f]ixed, mobile and portable (handheld) stations operating in the 1710-1755 MHz band are limited to a peak EIRP of 1 watt.”) (for AWS).

<sup>128</sup> Ericsson Comments at 22.

<sup>129</sup> *Id.* (adding that industry deploys hand-held units widely using non-constant envelope technologies “and, consistent with industry standards, measures EIRP limits based on average power without any evidence of harmful interference”).

<sup>130</sup> Motorola Reply Comments at 3, n.10.

<sup>131</sup> Sprint Nextel Reply Comments at 5.

<sup>132</sup> *See, e.g.,* CTIA Comments at 10 (claiming that a PAR limit is unnecessary for modern multicarrier systems, such as OFDM and CDMA); Ericsson Comments at 19 (arguing that “PAR is directly correlated to equipment and deployment cost, and is thus kept to a minimum in practice”) and at 22 (same regarding PAR for hand-held units); WCSW/XM Reply Comments at 7 (arguing that the Commission should adopt average power limits “without a limit on PAR”).

already act as a guard against a high PAR.<sup>133</sup> CTIA reiterates its position that adoption of a PAR limit “does not serve any sound regulatory purpose,” claiming also that “[m]arket forces already operate to minimize PAR, as there is a direct correlation between higher PAR and the cost of equipment and deployment.”<sup>134</sup> Nonetheless, CTIA (which represents the interests of both equipment manufacturers and network operators) states that if the Commission concludes that a PAR limit is necessary, a PAR limit of 13 dB would be appropriate.<sup>135</sup> Sprint Nextel notably states that, while it does not expect new wireless devices to “materially exceed” present [PAR] ratios, “the possibility that future wireless devices might produce more than the sporadic peaks that characterize current wireless devices cannot be entirely ruled out.”<sup>136</sup> Thus, it concludes that we may need to impose PAR limits on such devices “in the future,” and urges that we “proceed cautiously in applying the proposed average measurement techniques.”<sup>137</sup>

40. *Discussion.* For the reasons stated below and consistent with our decision to permit licensees to meet radiated power limits on an average basis in the 700 MHz Commercial Services Band<sup>138</sup> as well as for 700 MHz public safety broadband operations,<sup>139</sup> we find that the public interest would be served by amending our rules to similarly treat PCS licensees and AWS licensees. We conclude that for non-constant envelope technologies, such as CDMA, WCDMA, and OFDM, limiting power on an average basis will more accurately predict the interference potential for such technologies. The record demonstrates that using peak power measurements for non-constant envelope technologies inaccurately suggests a much higher overall operational power, compared to actual power levels, due to power spikes.<sup>140</sup> Consistent with our recent 700 MHz rule changes,<sup>141</sup> we believe that any effective increase in power that may be associated with limiting power on an average basis will be modest, and certainly outweighed by the benefit of measuring existing non-constant envelope technologies, as well as similar future technologies, using a more realistic and appropriate technique.<sup>142</sup>

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<sup>133</sup> See Qualcomm Comments at 10 (arguing that where PAR “is high for a given air interface, a base station employing that air interface would need to reduce its average power” to meet OOB limits). Commenting parties also note that non-constant envelope technologies currently co-exist with nearby operations without any significant interference problems. See Ericsson Comments at 19-20; Qualcomm Comments at 3, 9.

<sup>134</sup> CTIA Comments at 10; CTIA *Ex Parte* Letter filed February 6, 2007 (CTIA 2007 Letter) at 2.

<sup>135</sup> CTIA 2007 Letter at 2.

<sup>136</sup> Sprint Nextel Reply Comments at 5.

<sup>137</sup> *Id.*

<sup>138</sup> *April 700 MHz Order*, 22 FCC Rcd at 8103-04.

<sup>139</sup> *August 700 MHz Order*, 22 FCC Rcd at 15417-18.

<sup>140</sup> See, e.g., CTIA Comments at 10.

<sup>141</sup> *April 700 MHz Order*, 22 FCC Rcd at 8103; see also *August 700 MHz Order*, 22 FCC Rcd at 15417-18.

<sup>142</sup> See, e.g., *April 700 MHz Order*, 22 FCC Rcd at 8103.

41. We agree with Ericsson that the same reasons for permitting average power measurements for base stations apply for mobile and portable units as well. In the interest of harmonizing our rules across similar services where appropriate, we determine that it serves the public interest to treat PCS/AWS mobile and portable units no differently from base stations and, accordingly, today we adopt changes to our rules to permit average power limits for PCS and AWS base stations, mobiles and portables.<sup>143</sup>

42. We find that measurement of average power for PCS and AWS operations must be made during a period of continuous transmission based on a 1 MHz resolution bandwidth.<sup>144</sup> Parties should consult with the FCC Laboratory staff for guidance on the appropriate method of measuring average power for particular technologies. Because the average power approach will allow for emissions higher than permitted under today's PCS and AWS peak power limits, we also conclude that it serves the public interest to adopt a PAR limit to mitigate the potential for undesirable interference that could result otherwise. In the *April 700 MHz Order*, we found that limiting PAR to 13 dB strikes the right balance "between enabling licenses to use modulation schemes with high PARs (such as OFDM) and protecting other licensees from high PAR transmissions."<sup>145</sup> Similarly, we find that adoption of a 13 dB PAR limit when average EIRP is measured furthers our goal of facilitating the deployment of advanced technologies in the PCS and AWS bands, while limiting the potential for harmful interference that might result from high PAR transmissions.

#### D. Other Service Rules

43. *Background.* In the *Further Notice*, we specifically considered whether the CTIA Proposal should be applicable to "those Part 22 and Part 27 services that operate under a flexible regulatory framework similar to Part 24 broadband PCS," as well as other services.<sup>146</sup> We recognized that unique concerns might arise in applying the CTIA Proposal to services that may be less flexible than PCS, or to services that may use spectrum adjacent to public safety spectrum users or incumbent broadcasters.<sup>147</sup> In adopting or amending any technical rules, we are necessarily mindful of the potential for increased interference as well as other adverse effects on licensees. We sought comment on the issue of affording relief beyond PCS and AWS in the

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<sup>143</sup> As we explain above (*see supra* note 100), licensees will remain subject to our existing environmental regulations. *See, e.g.*, 47 C.F.R. §§ 1.1307 and 1.1310; *id.* § 2.1091 (governing RF radiation exposure evaluation specifically for mobile devices); *id.* § 2.1093 (governing RF radiation exposure evaluation specifically for portable devices).

<sup>144</sup> This requirement applies to PCS/AWS base stations and mobile/portable units alike. We also clarify that the calculation method that AWS licensees must use if they choose to continue measuring power in terms of peak values rather than average is the same method currently specified for PCS licensees. *See* 47 C.F.R. § 24.232(d).

<sup>145</sup> *See April 700 MHz Order*, 22 FCC Rcd at 8104. As noted above, CTIA indicates that a 13 dB PAR limit is the appropriate limit in the event the Commission determines that a PAR limit is warranted. *See supra* ¶ 39.

<sup>146</sup> *Further Notice*, 20 FCC Rcd at 13923, 13925.

<sup>147</sup> *Id.* at 13925.

context of this proceeding. We also specifically sought comment on the *ex parte* submission<sup>148</sup> by OP LLC (Crown Castle),<sup>149</sup> the sole nationwide licensee in the 1670-1675 MHz band, in response to the *Further Notice* seeking power increases and the application of PSD to the 1670-1675 MHz band. We separately address Crown Castle's filing and the 1670-1675 MHz band below.<sup>150</sup>

44. CTIA reiterates its belief that we should modify our EIRP rules for both PCS and AWS, but specifically argues that relief should not be extended to services such as BRS or EBS, which have different EIRP limits, unique coordination issues, and are undergoing significant transition.<sup>151</sup> Similarly regarding Part 22 cellular service, CTIA notes that such service is subject to a power limit that differs from the 1640 watts EIRP limit applicable to PCS and AWS and does not warrant the relief CTIA proposes.<sup>152</sup> Most commenters agree that the proposed rule changes should be applied to AWS as well as PCS.<sup>153</sup> Several also agree with CTIA that it is inappropriate to apply the same relief to other services at this time.<sup>154</sup>

45. WCSW and XM disagree with CTIA and urge the Commission to adopt the CTIA Proposal for base stations "in *all* services regulated under Parts 24 and 27 . . . ." <sup>155</sup> According to WCSW and XM, singling out licensees in the 2.3 GHz WCS band among Part 24 and Part 27 licensees for continued measurement of peak EIRP "will uniquely hinder WCS licensees from using . . . new and more efficient technologies, further impeding deployment in this spectrum

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<sup>148</sup> See Crown Castle 2005 Letter.

<sup>149</sup> In 2003, OP Corporation, which is another subsidiary of Crown Castle, won the license in FCC Auction No. 46. See "1670-1675 MHz Band Auction Closes," *Public Notice*, 18 FCC Rcd 9089 (WTB 2003). In 2004, OP Corporation assigned (*pro forma*) the license to OP LLC. See ULS File No. 0001988324 (filed Dec. 29, 2004). The license has a 10-year term, expiring on October 1, 2013. Section 27.902 authorizes licensees in this band "to provide fixed or mobile service, except aeronautical mobile service," pursuant to technical requirements specified in Subpart J, Part 27 of the Commission's rules. 47 C.F.R. § 27.902.

<sup>150</sup> See *infra* ¶¶ 52-55.

<sup>151</sup> See CTIA Comments at 5.

<sup>152</sup> See *id.*

<sup>153</sup> See Aloha Letter at 1; Crown Castle Comments at 1; Ericsson Comments at 23; Motorola Comments at 3; Powerwave Comments at 7; Sprint Nextel Reply Comments at 1-2.

<sup>154</sup> See Motorola Comments at 4; Sprint Nextel Reply Comments at 2-3; WCA Comments at 2-3. NPSTC specifically opposes comparable changes to the radiated power rules for services in the 800 MHz band, as discussed *infra* ¶ 46. See also *infra* ¶ 47.

<sup>155</sup> WCSW/XM Reply Comments at i (emphasis added); see also *id.* at 1-2 (referencing WCSW's waiver request submitted in May 2005 requesting authority to measure its power in the 2.3 GHz band at average rather than peak).

which has long been fallow.”<sup>156</sup> They support adoption of the PSD model for 2.3 GHz WCS base stations and argue that WCA’s objections on grounds of interference are unfounded.<sup>157</sup>

46. NPSTC focuses on the possible impact of the CTIA Proposal “in bands where there are adjacent public safety communications” and opposes “any change to the standard of measurement . . . or in raising power limits in the 800 MHz band until the ongoing reconfiguration is completed.”<sup>158</sup> Other companies echo NPSTC in noting the massive rebanding process ongoing for the 800 MHz specialized mobile radio (“SMR”) and public safety channels immediately adjacent to bands allocated for Part 22 use, and urge deferral of radiated power limit rules changes for the 800 MHz cellular band.<sup>159</sup> Sprint Nextel also observes that some of the “very complex” and “precise technical rules” that were developed “to overcome limitations from the 2.5 GHz band’s unpaired, overlapping and irregular licensing scheme . . . are still subject to refinement on reconsideration.”<sup>160</sup>

47. WCA filed comments expressing its concern that, in connection with a request for waiver filed by WCSW, this streamlining and harmonization proceeding might be used “as a vehicle for revisiting . . . Section 27.50(a) . . .”<sup>161</sup> Section 27.50(a) specifies a limit of 2000 watts “peak EIRP” for stations operating in the 2305-2320 and the 2345-2360 MHz bands. Recognizing that the *Further Notice* did not specifically invite comment on the radiated power rules for WCS at 2.3 GHz or for BRS and EBS at 2.1 GHz and 2.5 GHz,<sup>162</sup> WCA nonetheless cautions that any changes we make to the Part 27 rules “could affect BRS and EBS unless carefully crafted to preserve the *status quo*.”<sup>163</sup> Sirius opposes the WCSW/XM proposal to permit licensees in the WCS band to measure power in terms of average rather than peak values on grounds that any such change must take into account the harmful impact on the adjacent

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<sup>156</sup> WCSW/XM Reply Comments at 9 (specifically proposing adoption of a PSD limit of 4000 watts/MHz for 2.3 GHz WCS base stations).

<sup>157</sup> See WCSW/XM Reply Comments at 10-11 (adding that the flexibility to operate using a PSD model is “particularly appropriate” for the 2.3 GHz WCS band, “which the Commission intended to be used for a wide variety of services that could be provided using both narrowband and wideband technologies,” and that failure to apply the rule change to this band “would create a regulatory bias in favor of low-powered cellular systems that use exclusively narrowband technologies”).

<sup>158</sup> NPSTC Comments at 1, 6 (stating also that “the Commission’s 800 MHz decision is too far reaching and its technical underpinnings too reliant on current rules addressing power levels to change either the standard by which power is measured or to increase the power of a transmitter until reconfiguration is completed”). NPSTC further asserts that “the history of the 800 MHz band . . . reconfiguration is a caution to proposals of higher power levels and revised measurement standards promoting such in a spectrum environment where various technologies must coexist.” *Id.* at 6.

<sup>159</sup> See Motorola Comments at 4.

<sup>160</sup> Sprint Nextel Reply Comments at 3.

<sup>161</sup> WCA Comments at 4 (referencing WCSW’s May 2005 waiver request).

<sup>162</sup> *Id.* at 1.

<sup>163</sup> *Id.* at 2-3 (citing to the Commission’s BRS and EBS rulemaking proceeding, WT Docket No. 03-66, and the resulting decision).

satellite digital audio radio service (“Satellite DARS”).<sup>164</sup> Such changes in WCS emission rules should, Sirius argues, be deferred “[a]t least until terrestrial repeater rules are final.”<sup>165</sup>

48. *Discussion.* We conclude that the record does not support application of the CTIA Proposal to other bands at this time. While we acknowledge the value of consistency and regulatory parity generally in our rules, we cannot disregard the interference environment surrounding each service. Certain factors at issue with one service may not be present or relevant with other services. In a separate proceeding, for example, we carefully considered the implications of extending the CTIA Proposal to services operating in the Upper and Lower 700 MHz bands. Only after taking into account the unique features of such services, we decided to implement the PSD model in our radiated power rules and apply average power limits for operations in those bands, while declining to extend CTIA’s proposed further radiated power increases.<sup>166</sup>

49. With respect to the 2.3 GHz WCS band, we agree with WCA that there is “no ‘one size fits all’ power limitation that will prove optimum for every situation.”<sup>167</sup> WCA, which represents numerous WCS licensees, opposes application of PSD and average versus peak power limits to the band. WCA urges us to “refrain from utilizing this proceeding as a vehicle for revisiting the maximum EIRP at which a WCS base station operating in the 2305-2320 MHz or 2345-2360 MHz bands may transmit.”<sup>168</sup> According to WCA, “WCS licensees are deploying low powered cellular wireless broadband services utilizing their spectrum and would be subject to increased interference” and “there is no public interest basis to support revising the WCS maximum power limit.”<sup>169</sup>

50. Moreover, only one WCS licensee, WCSW (joined by XM), supported application of the CTIA Proposal to the 2.3 GHz band. WCSW had previously sought a waiver to use average rather than peak power limits in the band,<sup>170</sup> and had filed an application seeking Commission approval to be acquired by XM, an adjacent band Satellite DARS licensee.<sup>171</sup> On May 19, 2006, WCSW/XM jointly withdrew their transfer of control application.<sup>172</sup> WCSW then

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<sup>164</sup> See generally *Sirius Ex Parte* Letter filed Feb. 13, 2006 (Sirius Letter).

<sup>165</sup> *Id.* at 6.

<sup>166</sup> *April 700 MHz Order*, 22 FCC Rcd at 8098-99, 8103-04.

<sup>167</sup> WCA Comments at 2.

<sup>168</sup> *Id.* at 4.

<sup>169</sup> *Id.*

<sup>170</sup> See “Wireless Telecommunications Bureau Seeks Comment on WCS Wireless, LLC Request For Waiver of Section 27.50(a),” *Public Notice*, 20 FCC Rcd 10714 (WTB 2005).

<sup>171</sup> See ULS File No. 0002240823.

<sup>172</sup> See “Wireless Telecommunications Bureau Assignment of License Authorization Applications, Transfer of Control of Licensee Applications, De Facto Transfer Lease Applications And Spectrum Manager Lease Notifications Action,” *Public Notice*, 2006 WL 1491482 (F.C.C.), Report No. 2526 (WTB May 31, 2006) (noting withdrawal of the application).

withdrew its waiver request several days later on May 25, 2006.<sup>173</sup> In view of the foregoing, we find that the record before us does not support extension of the CTIA Proposal to the 2.3 GHz band at this time.<sup>174</sup>

51. Also, because frequencies immediately adjacent to the 800 MHz cellular band and the 2500 MHz BRS/EBS band are still undergoing significant restructuring to support a mixture of technologies and services, we decide to maintain the radiated power limits set forth in the current rules for BRS and EBS stations operating in the 2500 MHz bands, as well as stations operating in the 800 MHz or other bands -- at least until we can better assess the impact of additional power limit changes. We also conclude that this proceeding is not the appropriate forum in which to consider TerreStar's concerns about safeguards for the AWS H-Block systems, as those concerns are more appropriately resolved in the ongoing relevant proceeding.<sup>175</sup> Accordingly, the rule changes we adopt today are limited to those governing PCS and AWS stations, as defined at the outset of this *Third Report and Order*.<sup>176</sup>

52. 1670-1675 MHz Band. Background. Section 27.50(f)(1) of the Commission's rules specifies a peak 2 kW EIRP limit for fixed and base station operations in the 1670-1675 MHz band.<sup>177</sup> In the *Further Notice*, we sought comment on Crown Castle's request to apply PSD to the 1670-1675 MHz band,<sup>178</sup> as well as its request to double the 2 kW power limit for rural markets to 4 kW EIRP.<sup>179</sup> On the same date on which the Commission released the *Further Notice* (August 9, 2005), Crown Castle separately filed a request for waiver of the 2 kW EIRP limit for the 1670-1675 MHz band and requested authority to operate on a PSD basis at 4 kW EIRP/MHz in non-rural areas and 8 kW EIRP/MHz in rural areas.<sup>180</sup> Crown Castle argued that the public interest would be served by granting such relief, which would enable it to launch a new one-way (base-to-mobile) nationwide service (called Modeo) to wireless handsets with at

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<sup>173</sup> "Wireless Telecommunications Bureau Market-Based Applications Action," *Public Notice*, 2006 WL 1491479 (F.C.C.), Report No. 2519 (WTB May 31, 2006) (noting withdrawal of the waiver request).

<sup>174</sup> In another proceeding, the Commission has invited comment on whether to adopt a Power Flux Density limit for DARS terrestrial repeaters and for wireless operations in the 2305-2320 MHz or 2345-2360 MHz frequency band, and whether the limit should be measured on a peak or average basis. See Amendment of Part 27 of the Commission's Rules to Govern the Operation of Wireless Communications Services in the 2.3 GHz band; Establishment of Rules and Policies for the Digital Audio Radio Satellite Service in the 2310-2360 MHz Frequency Band, WT Docket No. 07-293, IB Docket No. 95-91, GEN Docket No. 90-357, RM No. 8610, *Notice of Proposed Rulemaking and Second Further Notice of Proposed Rulemaking*, 22 FCC Rcd 22123 (2007).

<sup>175</sup> See *supra* note 93.

<sup>176</sup> See *supra* ¶ 1. We discuss the 1670-1765 MHz band *infra* ¶¶ 52-55.

<sup>177</sup> 47 C.F.R. § 27.50(f)(1).

<sup>178</sup> *Further Notice*, 20 FCC Rcd at 13925.

<sup>179</sup> *Id.*

<sup>180</sup> See OP LLC, Licensee of WPYQ831, Request for Waiver, Statement in Support of Request of OP LLC and Crown Castle International Corp. for Waiver of Section 27.50(f)(1) of the Commission's Rules (Crown Castle Petition), ULS File No. 0002271317, at 1-5. See also Crown Castle Comments at 3-5, 7-8.

least 10 video and 24 audio channels using the new Digital Video Broadcasting--Transmission System for Handheld Terminals (DVB-H)<sup>181</sup> standard.<sup>182</sup> Crown Castle later limited its request to thirty initial markets<sup>183</sup> and stated that it would operate using a 5-MHz carrier bandwidth at each base station.<sup>184</sup>

53. In February 2007, we conditionally granted Crown Castle authority to deploy its proposed system using PSD at 4 kW/MHz and 8 kW/MHz for non-rural and rural areas, respectively, which we limited to thirty markets and the White Mountain Apache Reservation in Arizona, for which Crown Castle had been the recipient of a tribal lands bidding credit in the Commission's 2003 Auction No. 46.<sup>185</sup> More importantly, in order to limit interference, we expanded the geographic area currently set forth in our Part 1 rules within which Crown Castle must coordinate its 1670-1675 MHz band operations with certain incumbent federal government users.<sup>186</sup> We also adopted detailed coordination and consultation conditions to protect vital National Weather Service and radio astronomy facilities from harmful interference.<sup>187</sup> The waiver grant was subject to several other conditions, including that waiver relief was "subject to any future Commission action in WT Docket 03-264 [the instant proceeding]."<sup>188</sup>

54. In July 2007, Crown Castle announced that it would not deploy a nationwide DVB-H system to provide Modeo service for which it had sought increased power levels.<sup>189</sup> Rather, effective July 23, 2007, Crown Castle leased, via a *de facto* transfer lease,<sup>190</sup> its spectrum

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<sup>181</sup> Additional information regarding DVB-H technology is available at <http://www.dvb-h.org/technology.htm>.

<sup>182</sup> See Presentation to the FCC on the use of the 1670-1675 MHz Band at 3 (September 28, 2006), filed with Letter dated September 29, 2006, from Ari Q. Fitzgerald, counsel to Crown Castle, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 03-264 (Crown Castle September 28, 2006 Presentation).

<sup>183</sup> See Letter dated October 4, 2006, from Ari Q. Fitzgerald, counsel to Crown Castle, to Fred Campbell, Legal Advisor to FCC Chairman Kevin Martin, Attachment A (Initial Market Deployment Plan) (requesting relief in thirty markets corresponding to CMAs 1-20, 22, 24, 26, 27, 30, 33, 35, 72, 75, and 93).

<sup>184</sup> Crown Castle Petition at 2.

<sup>185</sup> OP LLC (Crown Castle International Corp.), Licensee of WPYQ831, Petition for Waiver of Section 27.50(f)(1) of the Commission's Rules, *Memorandum Opinion and Order*, 22 FCC Rcd 4322 (2007) (*Crown Castle Waiver Order*).

<sup>186</sup> See 47 C.F.R. § 1.924(g)(1). The expanded coordination zones were the result of discussions between Crown Castle and NTIA as reflected in the exhibit attached in support of Crown Castle's waiver filing. See Department of Defense Joint Spectrum Center, *NOAA GOES Sensor Data Downlink Coordination Zones for Proposed Transmitters in the 1670 to 1675 MHz Frequency Band (JSC report)*, attachment to ULS File No. 00022271317. The expanded zones were also approved by the Interdepartmental Radio Advisory Committee (IRAC). See <http://www.ntia.doc.gov/osmhome/irac.html>.

<sup>187</sup> *Crown Castle Waiver Order*, 22 FCC Rcd at 4329-30, and at 4332, Appendix.

<sup>188</sup> *Id.* at 4329-30.

<sup>189</sup> See "Crown Castle Announces Long-Term Modeo Spectrum Lease," available at <http://investor.crowncastle.com/releasedetail.cfm?ReleaseID=255947> (Crown Castle Press Release).

<sup>190</sup> See 47 C.F.R. § 1.9030 (long term *de facto* transfer leasing arrangements).

in the 1670-1675 MHz band to TVCC One Six Holdings, LLC (TVCC). The Crown Castle/TVCC lease arrangement provides that it “will enable [TVCC] to provide a variety of fixed and/or mobile services nationwide, including broadband services, consistent with the Commission’s rules for the 1670-1675 MHz band.”<sup>191</sup>

55. *Discussion.* Based on the record before us and for the reasons stated below, we decline to apply the PSD model by rule to the entire 1670-1675 MHz band as Crown Castle requests. In the *Crown Castle Waiver Order*, we reasoned that the grant of relief should be limited to 30 markets to enable the Commission to “assess whether there are any unanticipated issues associated with Crown Castle’s proposed use of higher power limits in the 1670-1675 MHz band.”<sup>192</sup> Because Crown Castle has chosen not to deploy a DVB-H system in the band,<sup>193</sup> the record before us is insufficient to determine whether the public interest would be served by granting additional power for other markets for the 1670-1675 MHz band. We continue to believe that it would be prudent for the Commission to have actual operational data to evaluate the potential consequences of applying the PSD model to other markets in this band. Thus, our action today leaves intact the relief afforded previously to Crown Castle. Accordingly, in view of the foregoing, we decline to amend our rules to permit use of the PSD model nationwide in this band. TVCC is entitled to avail itself of the relief granted through waiver for the 30 markets specified in Crown Castle’s Initial Market Deployment Plan, subject to the conditions in the *Crown Castle Waiver Order*. In addition, TVCC may submit a waiver request, with appropriate justification, for similar relief in additional markets.

#### IV. PROCEDURAL MATTERS

##### A. Congressional Review Act

56. The Commission will send a copy of the *Third Report and Order*, including the Final Regulatory Flexibility Certification, in a report to Congress pursuant to the Congressional Review Act.<sup>194</sup> In addition, this *Third Report and Order* (including the Final Regulatory Flexibility Certification) will be sent to the Chief Counsel for Advocacy of the SBA, and will be published in the Federal Register.<sup>195</sup>

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<sup>191</sup> See ULS File No. 0003108073 (filed July 17, 2007) (Lease ID L000002305).

<sup>192</sup> *Crown Castle Waiver Order*, 22 FCC Rcd at 4328.

<sup>193</sup> On August 31, 2007, OP LLC (the subsidiary of Crown Castle that holds the license) filed a “Tribal Land Construction Certification and Demonstration,” which states that a DVB-H “network and service offering has been launched and is operating that covers 86% of the population” of the White Mountain Apache Reservation. See ULS File No. 0003160142. This certification is currently pending before the Wireless Telecommunications Bureau.

<sup>194</sup> See 5 U.S.C. § 801(a)(1)(A).

<sup>195</sup> See 5 U.S.C. § 605(b).

## B. Final Regulatory Flexibility Certification

57. The Regulatory Flexibility Act of 1980, as amended (RFA),<sup>196</sup> requires that a regulatory flexibility analysis be prepared for notice-and-comment rule making proceedings, unless the agency certifies that “the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities.”<sup>197</sup> The RFA generally defines the term “small entity” as having the same meaning as the terms “small business,” “small organization,” and “small governmental jurisdiction.”<sup>198</sup> In addition, the term “small business” has the same meaning as the term “small business concern” under the Small Business Act.<sup>199</sup> A “small business concern” is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the Small Business Administration (SBA).<sup>200</sup>

58. As required by the RFA, an Initial Regulatory Flexibility Analysis (IRFA) was incorporated in the *Further Notice* in this proceeding,<sup>201</sup> which the Commission launched in 2004 to fulfill its Section 11 mandate to conduct biennial reviews.<sup>202</sup> With the goal of streamlining and harmonizing certain WRS licensing provisions, the Commission sought written comment, as explained above in more detail, on certain proposed amendments to its radiated power rules.<sup>203</sup> The Commission also requested written comment on whether changes to other technical rules might be warranted in conjunction with changes to the radiated power rules.<sup>204</sup> Additionally, the Commission sought written public comment on the IRFA.<sup>205</sup> No comments specifically addressed the IRFA. This Final Regulatory Flexibility Certification conforms to the RFA.<sup>206</sup>

59. In this *Third Report and Order*, the Commission takes further steps to streamline and harmonize its rules related to WRS by adopting modifications to the rules governing radiated

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<sup>196</sup> The RFA, *see* 5 U.S.C. § 601–612, has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996).

<sup>197</sup> 5 U.S.C. § 605(b).

<sup>198</sup> 5 U.S.C. § 601(6).

<sup>199</sup> 5 U.S.C. § 601(3) (incorporating by reference the definition of “small-business concern” in the Small Business Act, 15 U.S.C. § 632). Pursuant to 5 U.S.C. § 601(3), the statutory definition of a small business applies “unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register.”

<sup>200</sup> 15 U.S.C. § 632.

<sup>201</sup> *See Further Notice*, 20 FCC Rcd at 13948, Appendix B.

<sup>202</sup> *See supra* note 11 and accompanying text.

<sup>203</sup> *See supra* ¶ 1.

<sup>204</sup> *See id.*

<sup>205</sup> *See Further Notice*, 20 FCC Rcd at 13935.

<sup>206</sup> *See* 5 U.S.C. § 605(b).

power limits for PCS and AWS (as defined above). Specifically, whereas the existing rules set the radiated power limits in terms of watts-per-emission regardless of bandwidth size, the Commission will now permit use of a PSD model, with radiated power levels calculated on a watts-per-megahertz basis, when operating with greater than 1 MHz bandwidth.<sup>207</sup> The PSD approach offers more flexibility, is more technologically neutral, and will better accommodate newer technologies employing wider bandwidths. Also, the PSD model will potentially reduce infrastructure costs, thus enabling rural service providers to offer enhanced service in these areas. The Commission also will now permit PCS and AWS licensees to measure and express radiated power on an average rather than peak basis.<sup>208</sup> This approach is more realistic and more appropriate for newer wireless technologies producing emissions with sub-microsecond power spikes.

60. Because of interference concerns, the Commission is declining to double the baseline radiated power limits for PCS/AWS. In addition, to mitigate the potential for increased interference to other licensees that could result from measuring average (rather than peak) radiated power, the Commission is adopting a PAR limit of 13 dB.<sup>209</sup> At this time, the Commission is not adopting similar changes to the radiated power rules for other services,<sup>210</sup> but maintains the February, 2007 waiver relief granted to Crown Castle in the 1670-1675 MHz band.<sup>211</sup> As Crown Castle is the sole national licensee of spectrum in that band, the waiver relief does not directly affect any other licensees.

61. The above-described rule changes we adopt today are generally supported by the commenting parties. None of the modifications imposes increased reporting burdens on PCS or AWS licensees, nor do we expect the rule changes to result in increased costs for such licensees. As noted above, infrastructure costs potentially will be reduced, particularly in rural areas. The changes are designed to improve flexibility for licensees employing wideband technologies used to provide advanced, high speed services, while maintaining interference control. We believe they will prove beneficial to such PCS and AWS licensees and not have any adverse economic impact on them. Therefore, we certify that the rule changes adopted in this *Third Report and Order* will not have a significant economic impact on a substantial number of small entities.

### C. Paperwork Reduction Act of 1995

62. This document does not contain any proposed, new, or modified information collection subject to the Paperwork Reduction Act of 1995 (PRA), Public Law 104-13. In addition, therefore, it does not contain any new or modified “information collection burden for

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<sup>207</sup> See *supra* Section III.A.

<sup>208</sup> See *supra* Section III.C.

<sup>209</sup> See *supra* ¶ 42.

<sup>210</sup> See *supra* ¶ 48 (explaining, however, that similar changes have already been adopted for operations in the Upper and Lower 700 MHz bands).

<sup>211</sup> See *supra* ¶¶ 52-55.

small business concerns with fewer than 25 employees,” pursuant to the Small Business Paperwork Relief Act of 2002, Public Law 107-198.<sup>212</sup>

**D. Contact Information**

63. The primary Wireless Telecommunications Bureau contact for this proceeding is Nina Shafran of the Mobility Division (202-418-0620). Press inquiries should be directed to Chelsea Fallon, Wireless Telecommunications Bureau, at (202) 418-7991, TTY at (202) 418-7233, or e-mail at Chelsea.Fallon@fcc.gov.

**V. ORDERING CLAUSES**

64. IT IS ORDERED that, pursuant to the authority of sections 4(i), 7, 11, 303(c), 303(f), 303(g), 303(r), and 332 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 303(c), 303(f), 303(g), 303(r), and 332, the rule changes specified in Appendix A ARE ADOPTED.

65. IT IS FURTHER ORDERED that the rule changes set forth in Appendix A WILL BECOME EFFECTIVE 30 days after publication in the *Federal Register*.

66. IT IS FURTHER ORDERED that the Commission’s Consumer and Governmental Affairs Bureau SHALL SEND a copy of this *Third Report and Order*, including the Final Regulatory Flexibility Certification, to the Chief Counsel for Advocacy of the Small Business Administration.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch  
Secretary

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<sup>212</sup> See 44 U.S.C. § 3506(c)(4).

## APPENDIX A

## Rule Changes

**Part 24 of Title 47 of the Code of Federal Regulations is amended as follows:**

1. Section 24.232 is revised to read as follows:

**§ 24.232 Power and antenna height limits.**

- (a) (1) Base stations with an emission bandwidth of 1 MHz or less are limited to 1640 watts equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT, except as described in paragraph (b) below.
- (2) Base stations with an emission bandwidth greater than 1 MHz are limited to 1640 watts/MHz equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT, except as described in paragraph (b) below.
- (3) Base station antenna heights may exceed 300 meters HAAT with a corresponding reduction in power; *see* Tables 1 and 2 of this section.
- (4) The service area boundary limit and microwave protection criteria specified in Sec. 24.236 and Sec. 24.237 apply.

Table 1--Reduced Power for Base Station Antenna Heights Over 300 Meters, With Emission Bandwidth of 1 MHz or Less.

HAAT in meters	Maximum EIRP watts
≤300	1640
≤500	1070
≤1000	490
≤1500	270
≤2000	160

Table 2--Reduced Power for Base Station Antenna Heights Over 300 Meters, With Emission Bandwidth Greater than 1 MHz.

HAAT in meters	Maximum EIRP watts/MHz
≤300	1640

≤500	1070
≤1000	490
≤1500	270
≤2000	160

- (b) (1) Base stations that are located in counties with population densities of 100 persons or fewer per square mile, based upon the most recently available population statistics from the Bureau of the Census, with an emission bandwidth of 1 MHz or less are limited to 3280 watts equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT.
- (2) Base stations that are located in counties with population densities of 100 persons or fewer per square mile, based upon the most recently available population statistics from the Bureau of the Census, with an emission bandwidth greater than 1 MHz are limited to 3280 watts/MHz equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT.
- (3) Base station antenna heights may exceed 300 meters HAAT with a corresponding reduction in power; *see* Tables 3 and 4 of this section.
- (4) The service area boundary limit and microwave protection criteria specified in Sec. 24.236 and Sec. 24.237 apply.
- (5) Operation under this paragraph (b) at power limits greater than permitted under paragraph (a) of this section must be coordinated in advance with all broadband PCS licensees authorized to operate on adjacent frequency blocks within 120 kilometers (75 miles) of the base station and is limited to base stations located more than 120 kilometers (75 miles) from the Canadian border and more than 75 kilometers (45 miles) from the Mexican border.

Table 3 --Reduced Power for Base Station Antenna Heights Over 300 Meters, With Emission Bandwidth of 1 MHz or Less.

HAAT in meters	Maximum EIRP watts
≤300	3280
≤500	2140
≤1000	980
≤1500	540
≤2000	320

Table 4 --Reduced Power for Base Station Antenna Heights Over 300 Meters, With Emission Bandwidth Greater than 1 MHz.

HAAT in meters	Maximum EIRP watts/MHz
$\leq 300$	3280
$\leq 500$	2140
$\leq 1000$	980
$\leq 1500$	540
$\leq 2000$	320

- (c) Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.
- (d) Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of Sec. 24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.
- (e) Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, *etc.*, so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

Note to § 24.232: Height above average terrain (HAAT) is to be calculated using the method set forth in § 24.53 of this Part.

\* \* \* \* \*

**Part 27 of Title 47 of the Code of Federal Regulations is amended as follows:**

- 2. The authority citation for Part 27 continues to read as follows:

AUTHORITY: 47 U.S.C. 154, 301, 302, 303, 307, 309, 332, 336, and 337 unless otherwise noted.

- 3. Section 27.50(d) is revised to read as follows:

**§ 27.50 Power and antenna height limits.**

\* \* \* \* \*

- (d) The following power and antenna height requirements apply to stations transmitting in the 1710-1755 MHz and 2110-2155 MHz bands:
  - (1) The power of each fixed or base station transmitting in the 2110-2155 MHz band and located in any county with population density of 100 or fewer persons per square

- mile, based upon the most recently available population statistics from the Bureau of the Census, is limited to:
- (A) an equivalent isotropically radiated power (EIRP) of 3280 watts when transmitting with an emission bandwidth of 1 MHz or less;
  - (B) an EIRP of 3280 watts/MHz when transmitting with an emission bandwidth greater than 1 MHz.
- (2) The power of each fixed or base station transmitting in the 2110-2155 MHz band and situated in any geographic location other than that described in paragraph (d)(1) is limited to:
- (A) an equivalent isotropically radiated power (EIRP) of 1640 watts when transmitting with an emission bandwidth of 1 MHz or less;
  - (B) an EIRP of 1640 watts/MHz when transmitting with an emission bandwidth greater than 1 MHz.
- (3) A licensee operating a base or fixed station in the 2110-2155 MHz band utilizing a power greater than 1640 watts EIRP and greater than 1640 watts/MHz EIRP must coordinate such operations in advance with all Government and non-Government satellite entities in the 2025-2110 MHz band. Operations with power greater than 1640 watts EIRP and greater than 1640 watts/MHz EIRP must be coordinated in advance with the following licensees authorized to operate within 120 kilometers (75 miles) of the base or fixed station operating in this band: all Broadband Radio Service (BRS) licensees authorized under Part 27 in the 2155-2160 MHz band and all advanced wireless services (AWS) licensees authorized to operate on adjacent frequency blocks in the 2110-2155 MHz band.
- (4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band are limited to 1 watt EIRP. Fixed stations operating in this band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in this band must employ a means for limiting power to the minimum necessary for successful communications.
- (5) Equipment employed must be authorized in accordance with the provisions of Sec. 24.51. Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (d)(6) of this section. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.
- (6) Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as

detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, *etc.*, so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

\* \* \* \* \*

**APPENDIX B****List of Commenters****I. Comments**

Crown Castle International Corp.  
CTIA – The Wireless Association  
Ericsson, Inc.  
Motorola, Inc.  
National Public Safety Telecommunications Council  
Powerwave Technologies, Inc.  
QUALCOMM Incorporated  
TerreStar Networks Inc.  
Wireless Communications Association International, Inc.

**II. Reply Comments**

Crown Castle International Corp.  
Ericsson, Inc.  
Motorola, Inc.  
National Public Safety Telecommunications Council  
Sprint Nextel Corporation  
WCS Wireless, LLC, jointly with  
XM Satellite Radio Holdings, Inc.

**III. Ex Parte Filings**

Aloha Partners, L.P.  
Crown Castle International Corp.  
CTIA – The Wireless Association  
Ericsson, Inc.  
Sirius Satellite Radio Inc.  
Wireless Communications Association International, Inc.

